REMARKS

Reconsideration of this application, as amended, is respectfully requested.

Claims 29-36, 38-46, and 50-51 have been rejected. Claim 44 has been objected to.

In this response, claims 29-31, 39-40, 44-45, and 50 have been amended. Claims 32 and 33 have been canceled. Claims 52-57 have been added. Support for the amendments is found in the specification, the drawings, and in the claims as originally filed. Applicant submits that the amendments do not add new matter.

Applicants respectfully submit that the amended and new claims fall within Group II that was elected in response to the restriction requirement.

Applicants reserve all rights with respect to the applicability of the Doctrine of Equivalents.

The Examiner has objected to claim 44.

Applicants have amended claim 44 in light of the Examiner's objection.

Therefore, applicants respectfully submit that the Examiner's objection to the claim 44 has been overcome.

Claims 31, 34, and 38-39 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Publication No. 2003/0189215 to Lee et al. ("Lee").

Applicants do not admit that Lee is prior art and applicants reserve the right to swear behind Lee.

Amended claim 31 reads as follows:

> A light emitting device comprising:
> epitaxial layers;
> a first ohmic contact layer on a first surface of the epitaxial layers;
> an adhesive layer on the first ohmic contact layer;
> a seed layer of a thermally conductive metal on the adhesive layer;
> a relatively thick layer of a thermally conductive metal electroplated on the seed

layer, and a second ohmic contact layer on a second surface of the epitaxial layers.

(Amended claim 31)(emphasis added)

As set forth above, amended claim 31 requires an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer.

Lee discloses methods for fabricating semiconductor devices, such as vertical topology LEDs. (paragraph [0030]). More specifically, Lee discloses the following:

> Referring now to FIG. 8, after the posts 154 are formed, a metal support layer 156 approximately 50 μm is formed over the posts 154 and over the p-contacts 150. The posts 154 prevent the metal that forms the metal support layer 156 from entering into the trenches. The metal support layer 156 is beneficially comprised of a metal having good electrical and thermal conductivity and that is easily formed, such as by electroplating, by electro-less plating, by CVD, or by sputtering. Before electroplating or electro-less plating, it is beneficial to coat the surface with a suitable metal, such as by sputtering. For example, the metal support layer 156 can be Cu, Cr, Ni, Au, Ag, Mo, Pt, Pd, W, or Al. Alternatively, the metal support layer 156 can be comprised of a metal-containing material such as titanium nitride.

(Lee, paragraph [0041]) (emphasis added).

In particular, Lee discloses in Figure 15 p-contacts 150 deposited directly on the metal support layer 156. In contrast, amended claim 31 refers to an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer. Lee fails to disclose an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer, as recited in amended claim 31.

Because Lee fails to disclose all limitations of amended claim 31, applicants respectfully submit that claim 31, as amended, is not anticipated by Lee under 35 U.S.C. §102(e).

Given that claims 34, and 38-39 depend from amended claim 31, and add additional limitations, applicants respectfully submit that claims 34, and 38-39 are not anticipated by Lee under 35 U.S.C. §102(e).

Claims 29-30, 32-33, and 50-51 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lee, in view of U.S. Patent No. 5,811,927 to Anderson et al. ("Anderson").

Amended claim 29 reads as follows:

> A light emitting diode fabricated on a substrate, the light emitting diode comprising:
> a wafer with multiple epitaxial layers;
> a first ohmic contact layer on the epitaxial layers remote from the substrate;
> a seed layer of a thermally conductive metal applied to the first ohmic contact layer; and
> a relatively thick layer of the thermally conductive metal electroplated on the seed layer, wherein the substrate is removed.

(Amended claim 29)(emphasis added)

As set forth above, Lee fails to disclose a seed layer of a thermally conductive metal applied to the first ohmic contact layer; and a relatively thick layer of the thermally conductive metal electroplated on the seed layer, as recited in amended claim 29.

Anderson, in contrast, discloses a method of affixing spacers within a flat panel display. (col. 3 lines 10-12). More specifically, Anderson discloses that the spacers have members 104 made of a dielectric material (col. 3, lines 34-36, Figure 1). In particular, portions in Anderson referred to by the Examiner disclose the following:

> In other embodiments of a method in accordance with the present invention, metallic compliant members 112 include deposits of metal being formed on members 104. The deposits can be shaped hemispherically or in an otherwise similarly shaped pedestal. The pedestals can be deposited by selectively electroplating gold onto a bonding layer. The bonding layer includes an adhesion layer which is formed on the edge of member 104 and a seed layer which is formed on the adhesion layer. The adhesion layer includes a suitable metal such as titanium, and the seed layer is made from a suitable seeding material such as gold. Metallic compliant members 112 can also include metal structures

grown on edges 106 by selectively plating a metal via electroless plating solutions. Metallic compliant members 112 can also be provided by shadow mask deposition or by a patterned etch process.

(Anderson, col. 5, lines 8-23)(emphasis added)

Thus, Anderson discloses the bonding layer between the metallic pedestals and a dielectric material (members 104). In contrast, amended claim 29 refers to a seed layer of a thermally conductive metal applied to the first ohmic contact layer; and a relatively thick layer of the thermally conductive metal electroplated on the seed layer. Anderson fails to disclose a seed layer of a thermally conductive metal applied to the first ohmic contact layer; and a relatively thick layer of the thermally conductive metal electroplated on the seed layer, as recited in amended claim 29.

It is respectfully submitted that Lee does not teach or suggest a combination with Anderson, and Anderson does not teach or suggest a combination with Lee. Lee addresses fabricating vertical structure LEDs. Anderson, in contrast, addresses affixing spacers within a flat panel display. In particular, Anderson makes it clear that the purpose of the spacers 102 (including members 104) is to provide support such that there is "substantially uniform load distribution among the spacers" - i.e. the purpose of the spacers 102 are structural (col. 2 lines 3-11). It will thus be clear to one of ordinary skill in the art that Lee and Anderson disclose methods for different applications and the one of ordinary skill in the art reading Lee when faced with the object of the present application (i.e., to fabricate a relatively think conductive metal layer on semiconductor devices with heat conduction and/or electrical conduction and/or mechanical support, as disclosed in page 1 lines 5-10 of the specification) would not consider combining Lee with Anderson.

Anderson discloses in col. 3 lines 34-36 that the "members 104 are made from a dielectric material". One of ordinary skill in the art would understand that dielectric materials are poor conductors of heat and electricity and it accordingly follows that the usage of an "adhesion layer" and a "seed layer" in Anderson cannot be done to provide heat or electrical conductivity. Furthermore, col. 4 lines 27-30 of Anderson discloses that the metallic compliant members 112 containing the "adhesion layer" and the "seed layer", include "a metal having a low yield strength, thereby providing a material having suitable compliance to provide uniform spacing… ." It is thus also clear to one of ordinary skill in the art that the usage of an "adhesion layer" and a "seed layer" in Anderson are not intended to provide mechanical support. For at least these reasons, Anderson provides no incentive for a combination with Lee.

Furthermore, even if assuming for argument's sake, Lee and Anderson were combined, it is submitted that one of ordinary skill in the art would not be able to integrate the "adhesion layer" and "seed layer" of Anderson into the devices of Lee. Anderson discloses that the metallic compliant members 112 containing the "adhesion layer" and "seed layer" are "affixed" to portions of the metallic bonding pads 132 (col. 6 lines 48-50) using "standard metal-to-metal bonding techniques, such as thermocompression bonding, thermosonic bonding, [or] ultrasonic bonding" (col. 6 lines 56-59). Lee on the other hand discloses in para. [0041] that a metal support layer 156 is "formed over the posts 154 and over the p-contacts 150". This is done "by electroplating, by electro-less plating, by CVD, or by sputtering" (para. [0041]). It is clear that although the "adhesion layer" and "seed layer" in Anderson permit a metal-to-metal bond by "fixation", this does not mean that a metal layer can be "formed" upon the "adhesion layer" and "seed layer." Lee and Anderson are therefore incompatible art and not combinable.

In fact, Lee and Anderson are from two different domains – Lee from the domain of semiconductor device fabrication, while Anderson from the domain of flat panel display fabrication. It would be impermissible hindsight, based on applicants' own disclosure, to combine Lee and Anderson.

Furthermore, even if Lee and Anderson were combined, such a combination would still lack a seed layer of a thermally conductive metal applied to the first ohmic contact layer; and a relatively thick layer of the thermally conductive metal electroplated on the seed layer, as recited in amended claim 29.

Therefore, applicants respectfully submit that claim 29, as amended, is not obvious under 35 U.S.C. §103(a) over Lee in view of Anderson.

Given that amended independent claims 30 and 50 contain limitations that are similar to those limitations set forth above, applicants respectfully submit that claims 30 and 50, as amended, are not obvious under 35 U.S.C. §103(a) over Lee in view of Anderson.

Given that claims 32-33 and 51 depend from amended claims 30, and 50 respectively, applicants respectfully submit that claims 32-33 and 51 are not obvious under 35 U.S.C. §103(a) over Lee in view of Anderson.

Claims 35-36 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lee.

As set forth above, Lee fails to disclose an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer, as recited in amended claim 30.

Given that claims 35-36 depend from amended claim 30, and add additional limitations, applicants respectfully submit that claims 35-36 are not obvious under 35 U.S.C. §103(a) over Lee.

Claim 40 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Lee and further in view of U.S. Patent No. 6,319,778 to Chen et al. ("Chen").

It is respectfully submitted that Chen does not teach or suggest a combination with Lee, and Lee does not teach or suggest a combination with Chen. Lee refers to forming trenches to dice the individual LED devices. Chen, in contrast, refers to using a metal layer to prevent an emitting light of the LED from being absorbed by a substrate. It would be impermissible hindsight, based on applicants' own disclosure, to combine Lee and Chen.

As set forth above, Lee fails to disclose an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer, as recited in amended claim 31.

Chen, in contrast, discloses using the p-type ohmic contact metal layer as a high reflectivity mirror (col. 3, lines 26-39). Chen fails to disclose an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer, as recited in amended claim 31.

Furthermore, even if Chen and Lee were combined, such a combination would still lack an adhesive layer on the first ohmic contact layer; a seed layer of a thermally conductive metal on the adhesive layer; and a relatively thick layer of a thermally conductive metal electroplated on the seed layer, as recited in amended claim 31.

Given that claim 40 depends from amended claim 31, and adds additional limitations, applicants respectfully submit that claim 40 is not obvious under 35 U.S.C. §103(a) over Lee in view of Chen.

For similar reasons as to those set forth above, applicants likewise submit that new claims 52-57 are patentable over the cited references.

It is respectfully submitted that in view of the amendments and arguments set forth herein, the applicable rejections and objections have been overcome. If the Examiner believes a telephone conference would expedite the prosecution of the present application, the Examiner is invited to call the undersigned at (408) 720-8300.

If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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